# United States Patent [19]

**Cobble**

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[54] **KNIFE BLOCK FOR A TUFTING MACHINE**


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[52] **U.S. Cl.** ..... **112/79 R,** 83/700

[51] **Int. Cl.** ..... **D05c 15/24**

[58] **Field of Search** ..... 112/79 R, 79 A, 266; 83/698, 699, 700



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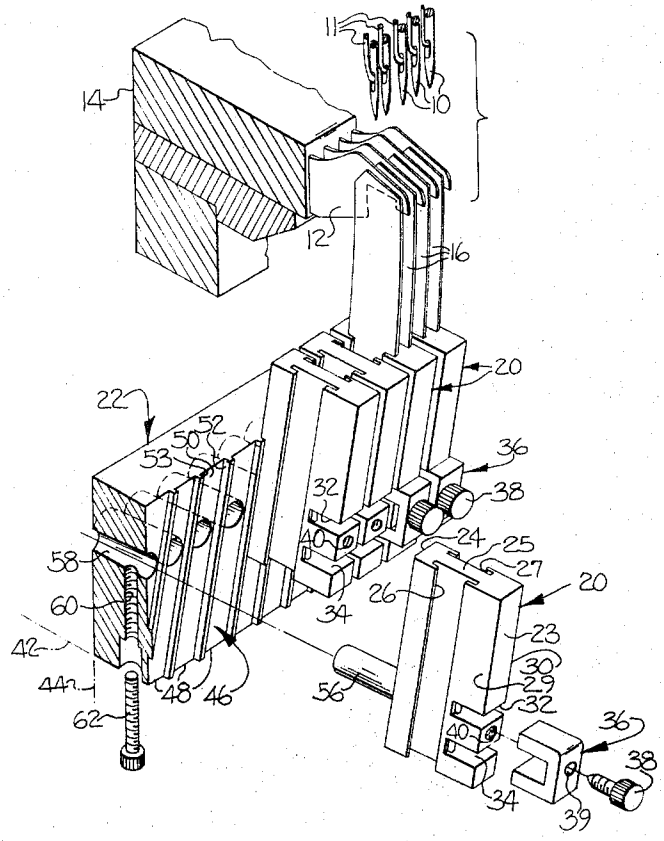
[57] **ABSTRACT**

A knife block for a tufting machine having provision for accurately aligning and connecting the block to an oscillating knife bar. The aligning and connecting structure includes a channel formed in the front surface of the bar, the channel being adapted to closely receive the rear edge portion of the block therein to maintain a predetermined alignment.


**6 Claims, 3 Drawing Figures**



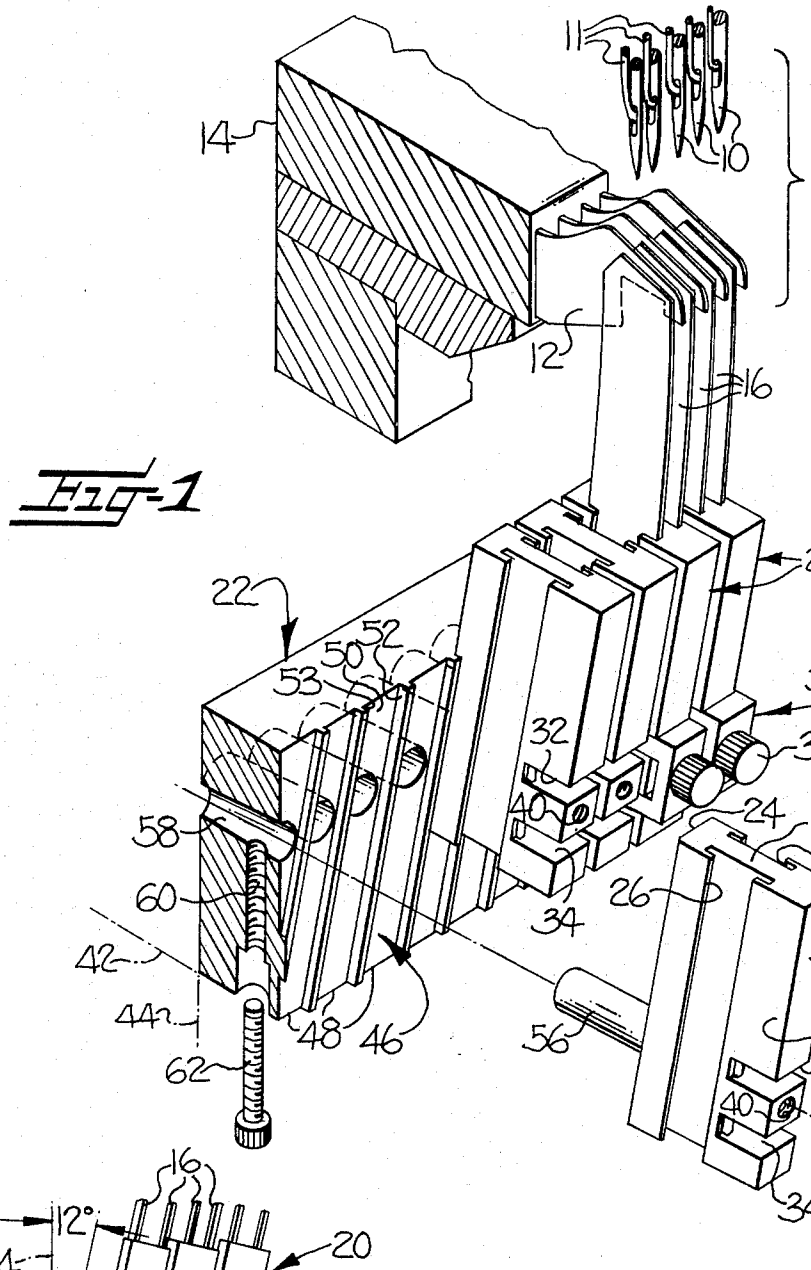



Fig-1

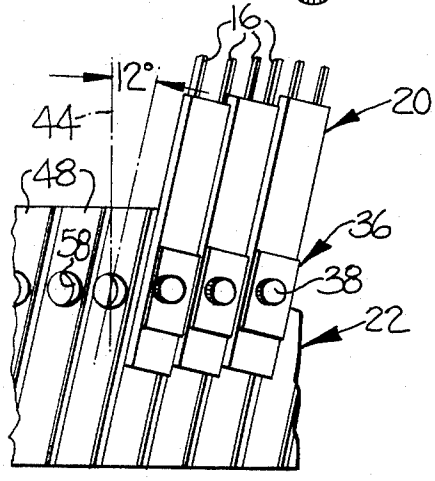



Fig-2

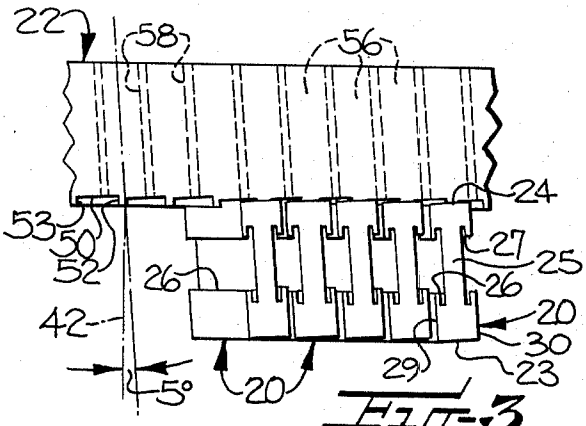



Fig-3

# KNIFE BLOCK FOR A TUFTING MACHINE

The present invention relates to a tufting machine for forming cut pile fabric, and more particularly to the means for mounting the cutting knives in a tufting machine.

In the tufting industry, many varied machines have been developed for carrying a yarn through a backing fabric to form a plurality of tufting loops, and for severing the loops to form the cut pile. A machine of this type generally includes a plurality of needles for carrying the yarn strands through the backing fabric, a cooperating looper associated with each needle for engaging and retaining the formed yarn loops, and a knife mounted on an oscillating knife bar for severing the yarn loops retained on the loopers.

In tufting machines of the above described type, it is conventional for the knife to be retained and held in a knife block, which in turn is carried by the oscillating knife bar such that the knife is reciprocated across the looper with a scissors-like cutting action. Typically, the knife block is mounted on the bar by means of a laterally extending shaft on the block which is inserted into a mating opening in the bar. A locking set screw is provided on the bar which engages the shaft to secure the same in the opening and thereby maintain the alignment of the block.

The operators of such prior tufting machines have experienced difficulty however in initially establishing the proper alignment between the knife block and bar, and maintaining the alignment under the stress and vibration encountered during long periods of use. As will be apparent, any misalignment can cause serious problems since the angular alignment between the knife and looper must be closely maintained to insure proper cutting action. Also, it is common for the machine operator to overly tighten the locking set screw in an attempt to maintain proper alignment, and this often results in damage to the shaft.

It is accordingly an object of the present invention to provide a connecting means of the described type wherein the desired alignment may be easily established and will be maintained under the stress and vibration encountered during long periods of use.

It is another object of the present invention to provide a connecting means of the described type which insures that the correct angle of the block and knife is always maintained, and which does not require any additional parts over those commonly employed in mounting the block to the bar in a conventional tufting machine.

These and other objects and advantages of the present invention are achieved in the embodiment illustrated herein by the provision of means for connecting the knife block to the knife bar which includes a channel formed in the front surface of the bar, the channel being adapted to closely receive the rear edge portion of the knife block therein. In addition, a cylindrical shaft extends from the rear edge portion of the knife block, and a cylindrical opening extends into the channel on the knife bar for closely receiving the cylindrical shaft. To lock the shaft in the opening, there is provided a threaded aperture which extends into the bar and communicates with the cylindrical opening, and a locking screw is adapted to be threadedly received in the aperture to engage the shaft.

To assemble the knife block to the bar, the shaft of the block is inserted into the cylindrical opening of the bar until the rear edge portion of the block is received in the conforming channel. By design, the knife carried by the block will be in the desired predetermined position with respect to the loopers when the block is so received in the channel of the knife bar. The locking screw is then rotated to engage the shaft to prevent withdrawal thereof. In this position, relative rotational movement between the block and bar is precluded by the closely conforming interconnection between the channel and block rear edge portion, and this relationship may be maintained with very little tightening of the locking screw. Thus, the danger of disfigurement to the shaft by over tightening of the locking screw is alleviated.



Some of the objects and advantages of the invention having been stated, others will appear as the description proceeds, when taken in connection with the accompanying drawings, in which --

FIG. **1** is a fragmentary perspective view, partly sectioned, of a severing mechanism in a cut pile tufting machine and which embodies the present invention;

FIG. **2** is a fragmentary front elevational view of the knife block and bar illustrated in FIG. **1**;

FIG. **3** is a fragmentary top plan view of the knife block and bar shown in FIG. **2**.

Referring to the drawings, FIG. **1** illustrates a severing mechanism in an otherwise conventional cut pile tufting machine, and which embodies the features of the present invention. As shown, the machine includes a plurality of reciprocating needles **10**, each of which carries a yarn **11** through a backing fabric (not shown) to form a plurality of tufting loops. A plurality of loopers **12** is secured to a looper head **14** such that each looper is operatively associated with one of the needles to engage and retain the tufting yarn loops. A cutting knife **16** is operatively associated with each looper to sever the yarn loops, the knives **16** being mounted for oscillatory movement in relation to the loopers. In particular, the knives are carried by a knife block **20** which in turn is mounted on an oscillating knife bar **22**. As will become apparent from the following description, a plurality of blocks **20** is mounted on the bar **22**, with each block being carried in a predetermined angular relationship with respect to the bar such that each knife will properly engage the associated looper **12** and sever the yarn in a scissors-like oscillating movement.

The knife block **20** comprises a generally rectangular unitary body member having an I-shaped cross-sectional configuration, and defines a forward edge portion including the generally planar surface **23**, and a rear edge portion including the generally planar surface **24**. A central connecting web **25** interconnects the forward and rear portions and defines a pair of knife mounting grooves **26** and **27**. The block further includes oppositely facing planar side edge surfaces **29** and **30**, each of which are partially cut away along a vertical direction to open communication with the associated grooves **26** and **27**. To secure the knives **16** in these grooves, a pair of spaced-apart slots **32** and **34** are provided which extend laterally into the surface **23** of the forward edge portion and into communication with the two grooves **26** and **27**. A U-shaped clamping bracket **36** is adapted to enter the lateral slots **32** and **34** such that the legs of the bracket will engage the two knives positioned in the grooves at two spaced locations. The bracket **36** is maintained in this position by means of the threaded cap screw **38** which extends

freely through the aperture **39** and is received in the threaded aperture **40** which extends laterally into the forward edge portion between the two slots.

As seen in FIG. **1**, the knife bar **22** is of generally rectangular cross section, and the illustrated right angled cross section defines a horizontal direction **42** and a vertical direction **44.** In addition, the bar defines a front surface **46** having a plurality of closely spaced vertically directed channels **48** extending along the longitudinal length thereof. Each of the channels has a U-shaped cross-sectional outline and defines a planar medial surface **50** and opposed side surfaces **52** and **53** extending perpendicularly from the medial surface **50.** As seen in FIGS. **2** and **3,** the side edge surfaces **52** and **53** are parallel and define planes which extend at an angle of about 12° from the vertical direction **44** and at an angle of about 5° from the horizontal direction **42.** This predetermined angular relationship is typical for certain tufting machines and insures that the knives **16** are maintained in a predetermined relationship with respect to the loopers **12** as will become more apparent.

The means for connecting the knife block to the bar further includes a cylindrical shaft **56** connected at one end to the lower portion of the rear edge surface **24** of the block **20.** The shaft **56** extends outwardly from the surface **24** in a generally perpendicular direction, and is adapted to be closely received in one of the cylindrical openings **58** which extend horizontally through the bar. In particular, each of the cylindrical openings **58** communicates with the medial surface **50** of one of the channels **48,** and extends perpendicular thereto.

In summary, it will be apparent that each channel **48** has a U-shaped cross-sectional outline defined by the planar medial surface **50** and opposed side edges **52** and **53,** and the rear edge portion of each block has a closely conforming U-shaped cross-sectional outline defined by the planar rear edge surface **24** and the oppositely facing side edge surfaces **29** and **30.** Thus, when the shaft **56** is fully inserted in its associated opening **58,** the rear edge surface **24** of the block will closely overlie the channel medial surface **50** and the channel side edge surfaces **52** and **53** will closely overlie the block side edge surfaces **29** and **30** to thereby preclude relative rotational movement between the block and bar about the axis of the shaft **56.**

To secure the block against withdrawal from the bar, there is provided means for locking the shaft **56** in the opening **58** which comprises a threaded aperture **60** extending vertically into the bar and communicating at substantially right angles with the opening. A threaded locking screw **62** is adapted to be threadedly received in the aperture **60** and engage the shaft **56.**

From the above description, it will be apparent that the present invention provides a novel knife block connecting structure whereby the cutting knives **16** are automatically and accurately aligned in relation to the loopers upon the block being mounted on the bar. The connecting structure is simple and foolproof, and does not require any additional structural components.

In the drawings and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only, and not for purposes of limitation.

That which is claimed is:

**1.** In a tufting machine for forming a cut pile fabric and including means for carrying a yarn through a backing fabric to form a plurality of tufting loops therein, the combination therewith of

looper means operatively associated with said yarn carrying means for engaging and retaining the tufting loops, and

means operatively associated with said looper means for severing the tufting loops while retained by said looper means and including a knife bar mounted for oscillatory movement in relation to said looper means and defining a front surface, a knife block defining a rear edge portion positioned opposite said knife bar front surface, a knife carried by said knife block and adapted to cooperate with said looper means in severing the yarn loop upon relative oscillatory movement between the knife bar and looper means, and means for connecting said knife block to said knife bar in a predetermined angular relationship such that the knife is maintained in a predetermined relationship with respect to said looper means,

said connecting means including a channel formed in said bar front surface, said channel having a cross-sectional outline closely conforming to the cross-sectional outline of said block rear edge portion and closely receiving the same therein, a cylindrical opening extending into said bar front surface and communicating with said channel, a cylindrical shaft having one end connected to said knife block rear edge portion and extending outwardly therefrom and closely received within said cylindrical opening, and means for locking said shaft in said opening.

**2.** The tufting machine as defined in claim **1** wherein said channel has a U-shaped cross-sectional outline defining a planar medial surface and opposed side edge surfaces, said block rear edge portion has a U-shaped cross-sectional outline defining a planar rear edge surface and oppositely facing side edge surfaces, whereby said block planar rear edge surface closely overlies said channel medial surface and said channel side edge surfaces closely overlie said block side edge surfaces to thereby preclude relative rotational movement between said knife block and said knife bar.

**3.** The tufting machine as defined in claim **2** wherein said means for locking said shaft in said opening includes a threaded aperture extending into said bar and communicating at substantially right angles with said cylindrical opening, and a locking screw adapted to be threadedly received in said threaded aperture and engage said shaft.

**4.** The tufting machine as defined in claim **3** wherein said cylindrical shaft and cylindrical opening define a common axis extending substantially perpendicular to said channel medial surface and said knife block planar rear edge surface.

**5.** The tufting machine as defined in claim **4** wherein said knife bar has a rectangular cross-section defining a vertical direction and a horizontal direction, and said channel side edge surfaces define planes which extend substantially perpendicular to said medial surface and at an angle of about 12° from said vertical direction and at an angle of about 5° from said horizontal direction.

**6.** In a tufting machine for forming a cut pile fabric including means for carrying a plurality of yarns through a backing fabric to form plurality of tufting loops therein, looper means operatively associated with said yarn carrying means for engaging and retaining the

tufting loops, means operatively associated with said looper means for severing the tufting loops while retained by said looper means and including a knife bar mounted for oscillatory movement in relation to said looper means, a plurality of knife blocks carried by said knife bar, and at least one knife carried by each knife block and adapted to cooperate with said looper means in severing the yarn loops upon relative oscillatory movement between the knife bar and looper means, the improvement therein comprising

means for connecting said knife blocks to said knife bar in a predetermined angular relationship such that the knives are maintained in a predetermined relationship with respect to said looper means, said connecting means including

a front surface on said knife bar, said front surface including a plurality of closely spaced, vertically directed channels along the longitudinal length thereof, each of said channels having a U-shaped cross-sectional outline,

a rear edge portion on each of said knife blocks, each of said rear edge portions defining a U-shaped cross-sectional outline generally conforming to the cross-sectional outline of said channels and closely received within one of said channels,

a plurality of cylindrical openings extending into said bar with one of said openings communicating with each of said channels,

a cylindrical shaft having one end connected to the rear edge portion of each knife block and being closely received within the associated cylindrical opening, and

means for locking each shaft in the associated opening.

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